A photograph taken in Paris in 1926 at a meeting of the International Institute for Intellectual Cooperation. Lorentz is on the extreme left.

Albert Einstein

at the Commission of Intellectual Cooperation of the League of Nations

P. Speziali, Geneva

In this commemorative year, numerous events all over the world — congresses, colloquia, exhibitions, articles in the press, presentations on radio and television – are marking the 100th anniversary of the birth of Albert Einstein. On these occasions, the life and work of the great scientist will be analysed from all aspects and we shall be made to understand the degree to which his contributions pervade so much of science today. In all this commendable effort of remembrance, one field of Einstein's activity, we believe, is likely to pass unnoticed — perhaps because it seems rather minor when compared with the huge volume that constitutes the rest: this is the participation of Einstein in the work of the Commission of Intellectual Cooperation of the League of Nations, between 1924 and 1930. It would be a pity not to fill this gap.

Formation of the Commission

In 1919, a year before Geneva was chosen for the headquarters of the League (on 16 May 1920), a motion had been put to the Peace Conference that a charter covering intellectual interests be incorporated in the League's constitution. It was not, however, until 21 September 1921 that the Council took the decision to create a Commission for this purpose. It was given freedom to establish its own programme, but three questions were put to it:
how to improve the international organization of scientific research ;
how to establish relations between different universities;
how to organize scientific information systems and the exchange of publications.

In May 1922, the Commission was established with 12 members of which one was Einstein.

The first plenary session of the Commission took place from 1 - 5 August, 1922 under the presidency of Henri Bergson, meetings being held in the old National Hotel promoted to the rank of international seat. Einstein was not present. He had sent a telegram from Berlin assuring the Commission of his cooperation and excusing himself for being unable to attend owing to the need to finish an important task. He was, in fact, on the eve of leaving for Japan. Einstein, nevertheless resigned, on the grounds that the League was not operating on an acceptable level and the following year he was replaced by Lorentz. He then went back on his decision, observing in a confidential letter to the Vice-President Gilbert Murray, on 30 May 1924 that "whatever the failures of the League of Nations in the past, it must be regarded as the one institution which holds out the best prospect of beneficient action in these sad times".

Einstein's Contribution

Einstein therefore appeared for the first time at the eight meetings of the fourth session 25-29 July 1924.

Biographies of Einstein quote the opening words addressed on this occasion by Bergson to Einstein but the succeeding remarks are also worthy of attention as expressing a contemporary appraisal. Translated they read:

"The commission greets in Dr. Einstein both a new and an old member. Like all the others he was named to the Commission without being consulted but he has now returned at his own request and so is twice a member. The Commission for its part is happy and proud to have him. His reputation is universal. You will perhaps allow a research scientist who has spent long months deeply immersed in his work to say that he sees there one of the most redoubtable efforts that man has ever made to push back the frontiers of human understanding. Having first interpreted in electromagnetism in an unexpected way the work of the great Lorentz, Dr. Einstein moved on from there to the theory of gravitation, introducing a quite new method which presages, no doubt new discoveries and which consists in obtaining an expression for phenomena that is independent of any particular point of view. The miracle is that this theory, whose difficulty is enough to put off professional scientists and philosophers, has excited the whole world. Dr. Einstein seems to have converted to his erudite conjectures a significant section of humanity. Can he bring about yet another conversion? During the war even, and before that, he had developed a concept of relations between peoples that differs little from the ideal of the League itself. If by his presence in the Commission, he can attract to this ideal all those who have shown interest in his extraordinary revelations, he will have rendered a new and very great service to humanity."

At the Palais des Nations in Geneva are the minutes of the Commission's meetings written up by the general rapporteur, Gonzague de Reynold. For the years 1922-1931 they make up two large quarto volumes. More than once they have been used by historians writing the history of the Commission but so far noone has asked for them in order to study particularly Einstein. Most of his biographers scarcely touch on the subject and then only with a condescension that seems unjustified.

Between 1924 and 1930 Einstein took part in all the July sessions of the Council in Geneva — a total of 55 meetings. We also find Einstein in 1926 attending four sessions of the International Institute for Intellectual Cooperation that was founded in Paris in 1924 as the executive organ of the Commission and financed by the French government.

Einstein's interventions in the discussions of the Commission were, at first sight, less frequent than those of the other Commission members but they were always pertinent and concrete. They ranged from the simple remark on a proposition or comment of a colleague to personal proposals, original and fruitful. Taking at random:

28 July, 1925 and the subject is the teaching of history.

The next day he is commenting on the standardization of scientific terminology.

26 July 1927, he drafts with Mme Curie a proposal regarding the role of the Institut de Paris.

His longest interventions are those of 24 July 1930 on the subject of teaching programmes and the dissemination of culture.

A few days later, he is participating in the discussions on the programme, work and organization of the Commission, and the Institute.

The other side of the collaboration of Einstein with the Commission relates to the sub-committee on the sciences and information systems. Minutes of its meetings reflect the presence of Einstein and in a certain way bring him to life for us. It would be tedious to mention all the subjects discussed, all the resolutions made and adopted by the sub-committee. Let us just say that they relate to the coordination of scientific information systems, library organization, exchanges of publications as well as different disciplines and their teaching.

Einstein as a Person

The above digest is but a brief resumé of various notes made during long readings, but it serves at least to mark the passage of Einstein through the Commission for Intellectual Cooperation, the work of which is now covered by UNESCO.

The business of international relations as we know from our own experiences in the European Physical Society is, for the minor part inspiration, and for the very large part mundane administration, in which often the little details require a disproportionate effort spent on them. That Einstein was prepared to concern himself with such matters shows us an aspect of his character that is not always appreciated. We are all conscious of his huge intellectual powers, his deep humanism, but we are frequently left with the image of a solitary figure, hair blowing in the wind, a sort of mystic living in the abstract. In his committee work, we find him also willing to become involved in the tedium of organizational affairs, aware of the boundary conditions imposed by practical politics, a man living in the world, sensitive to its tragedies and alive to the need to tackle the small practical problems that are within reach.

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Evidence for Gravitational Waves More Successes for GR

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Latest measurements on the characteristics of the radio emission from the binary pulsar PSR 1913+16 provide strong evidence for the existence of gravitational waves and support the conclusions of General Relativity in a remarkably consistent way. This then is the fifth major confirmation following the predictions of:

1) the advance of the perihelion of Mercury

2) the gravitational redshift of spectral lines

3) the deflection of light by massive objects

4) the radar echo delay dependency on gravitational fields.

Background

It was in 1974 that PSR 1913+16 was discovered — an object of such relevance to General Relativity that it constitutes a specialized laboratory in itself. Radio emissions from it, showed it to be a very condensed object (neutron star) rotating very rapidly, with a period of 59 ms, while periodic slight variations of the frequency revealed that the pulsar was orbiting around an invisible companion. Since no eclipse was observed, this companion had to be compact. Dispersion measurements indicate that no plasma is present in the region of the orbit, and the system is therefore sufficiently « clean », in the sense that no tidal interaction or mass transfer occurs, that observation of purely relativistic effects is possible.

Very accurate observations were initiated soon after the discovery of the pulsar, which led in the years 1975-76 to a most important first result[1]), namely that the periastron shift of the orbit (analogous to the perihelion shift of Mercury) is 4.22°/a (compared with only 43"/a for Mercury). The mass of the binary system could thus be inferred from the equations of General Relativity as 2.8 solar masses[2]) — the first time that the theory had been used to derive a physical quantity.

Latest Results

Details of new measurements and their interpretation were presented at the IXth Texas Symposium in Munich, 14-19 December, 1978. For four years, J. H. Taylor and his coworkers have been making very precise pulse measurements at the radio telescope of Arecibo in Puerto Rico, increasing the accuracy to about 1 %. Undoubtedly, the most important was the measurement of the rate of change of the orbital period which gave the result that :

$dB/dt = -3.2 \pm 0.06 \times 10^{-12}$

This is in excellent agreement with the predictions of General Relativity which on the basis of energy loss through the emission of gravitational radiation gives a value within a factor of 1.3 ± 0.3.

Taylor has examined explanations alternative to that of the emission of gravitational waves but they appear quite ad hoc and fail to match the observations by more than one order of magnitude. Consequently, it is difficult not to follow him in concluding that gravitational waves really do exist and carry away energy at the rate predicted by General Relativity.

Other parameters of importance that could be determined by the team were the: 1) Time delays due to both transverse Doppler shift and gravitational redshift, which give a ratio of about unity for the masses of the pulsar and its companion; i.e., each has a mass of about 1.4 $M_{\odot}$. 2) The sine of the inclination angle between the plane of the orbit and that of the sky to an accuracy of 20 % — impossible to do by classical methods.

Conclusion

This series of measurements on PSR 1913+16 has allowed us to take a major step forward in our knowledge of the fundamental laws of gravitation. GR has been confirmed at the post-newtonian level and beyond, and it has been used for the first time to derive physical parameters. In a compelling way the existence of gravitational waves has been made to appear very likely and stringent constraints have been set upon alternative theories of gravitation.

References

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